samlexpower®

Pure Sine Wave Power Inverter

SSW-350-12A
SSW-600-12A
SSW-1000-12A
SSW-1500-12A
SSW-2000-12A

Owner's Manual

Please read this manual BEFORE installing your inverter

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IMPORTANT SAFETY INSTRUCTIONS

THIS MANUAL CONTAINS IMPORTANT INFORMATION REGARDING SAFETY, OPERATION, MAINTENANCE AND STORAGE OF THIS PRODUCT. BEFORE USE, READ AND UNDERSTAND ALL CAUTIONS, WARNINGS, INSTRUCTIONS AND PRODUCT LABELS, PLUS YOUR VEHICLE'S BATTERY MANUFACTURER GUIDELINES. FAILURE TO DO SO COULD RESULT IN INJURY AND/OR PROPERTY DAMAGE.

To ensure reliable service, your power inverter must be installed and used properly. Please read the installation and operating instructions thoroughly prior to installation and use. Pay particular attention to the WARNING and CAUTION statements in this manual. The CAUTION statements advise against certain conditions and practices that may result in damage to your inverter. The WARNING statements identify conditions or practices that may result in personal injury. Read All Instructions Before Using This Power Inverter!

WARNINGS

TO REDUCE THE RISK OF FIRE, ELECTRIC SHOCK, EXPLOSION OR INJURY

1. Do not connect to AC distribution wiring. This inverter is NOT grid interactive.
2. Remove appliance plug from outlet strip or turn off inverter before working on the appliance. Multiple outlet power strips with switches and circuit breakers only interrupt power to the "hot" receptacle terminals. **For SSW-350-12A & SSW-600-12A, the "Neutral" terminals remain powered with respect to the "Ground" terminals.**
3. Do not make any electrical connections or disconnections in areas designated as IGNITION PROTECTED. This includes 12 V DC cigarette plug connections, and terminal connections.
4. This is not a toy - keep away from children.
5. DO NOT insert object into air vents.

CAUTIONS

1. The chassis and the input Negative terminal of the inverter are internally connected to the AC Ground. **Hence, the input Negative terminal should be used as the grounding terminal.** Do not use with Positive Grounded Electrical Systems (the majority of modern automobiles, RVs, trucks and boats are Negative Grounded Electrical Systems).
2. Observe correct polarity when connecting the DC input terminals of the inverter to the battery. Connect Positive of the battery to the Positive input connector of the inverter and the Negative of the battery to the Negative input terminal of the inverter. **Reverse polarity connection will result in a blown fuse and may cause permanent damage to the inverter. Damage due to reverse polarity is not covered under warranty.**
3. This inverter will not operate high wattage appliances that exceed the output power limit or the surge power limit.
4. **For SSW-350-12A & SSW-600-12A, grounding the Neutral will cause the inverter to shut down. Hence, do not connect the Neutral of the AC output receptacles to Ground.**
5. Do not operate this inverter if it is wet.
6. Do not install in engine compartment – please install in a well ventilated area.
7. This inverter is not tested for use with medical devices.

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IMPORTANT SAFETY INSTRUCTIONS

IMPORTANT WIRING INFORMATION

Substantial power loss and reduced battery operating time results from inverters installed with wires that are not sized correctly based on the length and the current required to be carried. Current flowing through a wire produces voltage drop along its length due to the resistance of the wire and due to the value of the current carried through it. The resistance of the wire is inversely proportional to the cross-sectional area of the wire (designated in mm^2 or AWG) and directly proportional to its length i.e. thinner and longer wire has higher resistance and hence, produces higher voltage drop. Similarly, thicker and shorter wire has lower resistance and hence, produces lower voltage drop. Hence, symptoms of low DC input voltage / battery power can result from wires that are either excessively long or have an insufficient cross-sectional area (designated in mm^2 or AWG). **The wires should be sized based on the maximum current they are required to carry and the distance between the battery and the inverter to limit the voltage drop to 2% to 5%.**

Wires are rated based on its insulation, temperature and operating environment. Please ensure that the wire insulation is of the appropriate type for the operating environment.

The installer/operator should be especially aware of the requirements to maintain secure, tight, water-resistant electrical connections and to provide for strain relief for DC wires and appliance wiring.

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HOW YOUR INVERTER WORKS

The inverter converts low voltage DC (Direct Current) from a battery or other DC power source to the standard nominal 115 volt AC (Alternating Current) household power.

DESIGN FEATURES

- High efficiency
- Compact size
- Low Idle current
- Soft Start Technology
- LCD Remote Control (for 1000 W, 1500 W & 2000 W models).

POWER RATINGS

The continuous power ratings of the models are as follows:

- SSW-350-12A - 350 Watts
- SSW-600-12A - 600 Watts
- SSW-1000-12A - 1000 Watts
- SSW-1500-12A - 1500 Watts
- SSW-2000-12A - 2000 Watts

PRINCIPLE OF OPERATION

The inverter converts power in two stages. The first stage is a DC to DC conversion process that raises the low voltage DC at the inverter input to high voltage DC of approximately 150 VDC. The second stage is the actual inverter stage that converts the high voltage DC into nominal 115 VAC, 60 Hz AC (RMS). The DC-to-DC converter stage uses modern high frequency power conversion techniques that have replaced the bulky transformers found in less technologically-advanced models. The inverter stage uses advanced power MOSFET transistors in a high frequency full bridge configuration.

THE OUTPUT WAVEFORM

The AC output waveform of the SSW-series inverter is known as “Pure Sine Wave” or “True Sine Wave”. It is a waveform that has characteristics same to the sine wave shape of utility power (See Fig. 1).

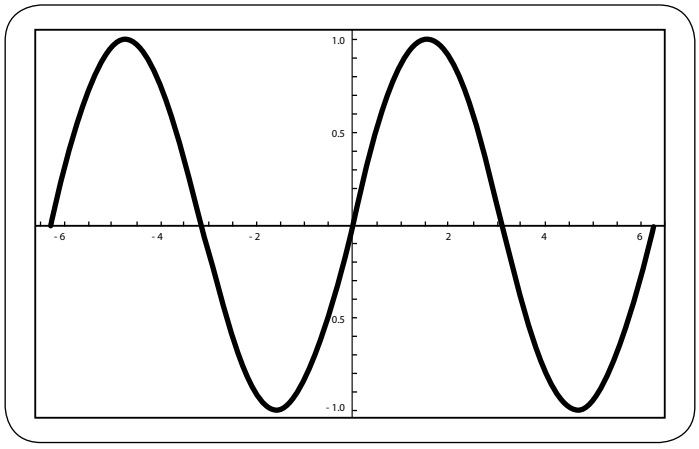

Fig.1. Pure Sine Wave Waveform

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INSTALLATION / ENVIRONMENTS

DC POWER SOURCE REQUIREMENTS
The DC power source must provide between 10.5 and 15.5 Volts DC and must be able to supply the necessary current to operate the load. The power source may be a battery or a well-regulated DC power supply. To obtain a rough estimate of the current (in Amperes) the power source must deliver, simply divide the power consumption of the load (in Watts AC) by 10.

Example: if a load is rated at 100 Watts AC, the DC power source must be able to deliver: 100 / 10 = 10A.

The inverter will provide you nominal 115 VAC when powered by a 12 VDC source such as is found in a vehicle or multiple battery configurations as shown in Fig. 2. **This manual does not describe all of the possible types of battery configurations, battery charging configurations and battery isolation configurations.**

For normal operation of the inverter, the DC power source must provide between 11.0 and 15.0 VDC and the required current. This DC power source must be a well-regulated DC power supply or alternator and deep cycle battery system typically found in vehicles and marine crafts. The DC power source may also be two or more 12 volt batteries connected in parallel. On larger applications, the power source may be several batteries connected in parallel as shown in Fig. 2.

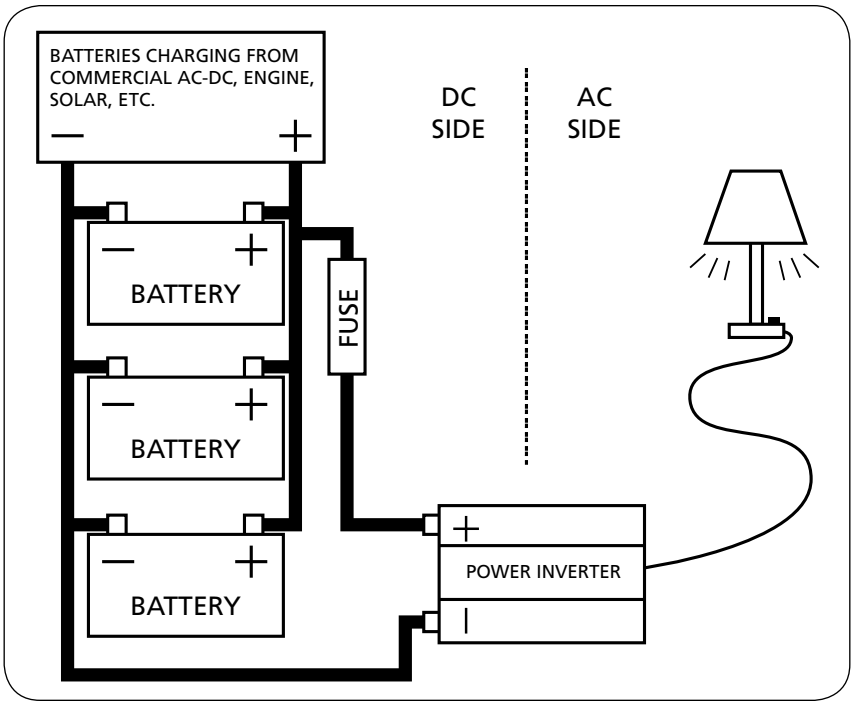

Fig.2. Connecting to a DC Power Source

INSTALLATION NOTES
WARNING: Ensure ventilation when using batteries. Batteries may generate flammable gas during charging or discharging.

The inverter (350 W to 2000 W models) has four slots in its mounting bracket that allow the unit to be fastened against a bulkhead, floor, wall or other flat surface. Ideally, the mounting surface should be cool to the touch. **It is more electrically efficient to use longer AC wiring than DC wiring, so install the inverter as close as possible to the 12 VDC power source.**

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INSTALLATION / ENVIRONMENTS

The inverter can be operated in any position, however, if it is to be mounted on a wall, mount it horizontally (Fig 3a) so that indicators, switches, outlets and terminal blocks located on the front panel are visible and accessible. Do not mount on wall in positions shown in Figs. 3 (b) & 3(c). If the inverter is to be installed in a moving vehicle, we strongly recommend that the inverter be shock-mounted either on the floor (in a clear, safe area) or on a secure flat surface
(Fig 3a)

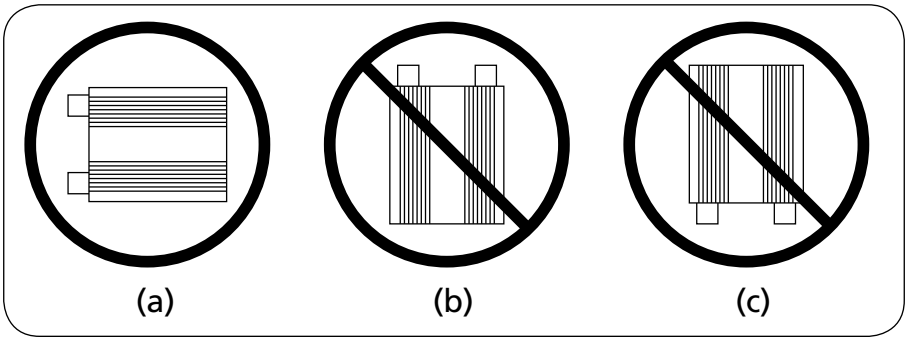

Fig. 3 Mounting arrangement on wall

CAUTION
The power inverter must be connected only to batteries with a nominal output voltage of 12 V. The unit will not operate from a 6 Volt battery, and will sustain **permanent damage** if connected to a 24 V battery.

CAUTION
Loose connectors may cause overheated wires and melted insulation. Check to make sure you have not reversed the polarity. Reverse polarity connection will result in a blown fuse and may cause **permanent damage** to the inverter. **Damage due to reverse polarity is not covered by warranty.**

CONNECTING TO A DC POWER SOURCE

Please ensure that the DC side wires and external fuses are selected as given below.

Note that an external fuse is required to protect the battery wires from short circuit. A battery is an unlimited source of current and can deliver extremely high (up to 10,000 A of current) into a short circuit that will melt the wires and cause fire hazard.

Current limiting fuse with Ampere Interrupting Capacity (AIC) of 10000 A or more or Class T fuse is, therefore, recommended.

External FUSE and DC wire selection

WATTAGE OF THE INVERTER	CAPACITY OF THE FUSE	RECOMMENDED MODEL NO. OF FUSE ASSEMBLY MANUFACTURED BY SAMLEX AMERICA, INC.	WIRE SIZE (AWG)	MAX DISTANCE BETWEEN INVERTER AND THE BATTERY
350W	50A		#8	1.5M
600W	80A		#6	1.5M
1000W	150A		#4	1.2M
1500W	200A	DC-FA-200	#2	1.2M
2000W	300A	DC-FA-300	2 X #2	1.0M

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INSTALLATION / ENVIRONMENTS

CONNECTING WIRES FOR BATTERY INPUT POWER - SSW-350-12A & SSW-600-12A
For convenience of providing DC input power from the battery, the 350 W Model No. SSW-350-12A and the 600 W Model No. SSW-600-12A are provided with the following DC connecting wires:

- SSW-600-12A - 3 ft. long pair of Positive and Negative wires with battery clamps
- SSW-350-12A - 3 ft. long pair of Positive and Negative wires with battery clamps

When using these wires, please ensure that appropriate DC fuses are used as recommended in the Table on page 7.

CONNECTING WIRES FOR BATTERY INPUT POWER – SSW-1000-12A, SSW-1500-12A & SSW-2000-12A
DC side connecting wires have not been provided for these inverters and these have to be arranged by the end user. Please use the appropriate sizes of wires and fuses as per recommendations provided in the Table given on page 7.

Crimp / solder appropriate ring type of lugs on the wire ends that connect to the DC side input terminals to suit the size of the wire and the M9 stud.

DC SIDE INPUT TERMINALS
The following DC side input terminals have been provided:

- SSW-350-12A & SSW-600-12A - Thumb screw – size M4
- SSW-1000-12A, SSW-1500-12A, SSW-2000-12A - Stud and nut – size M9

MAKING DC SIDE CONNECTIONS

1. Ensure that appropriate terminal lugs are used and are properly crimped / soldered at the bare ends of the wires for secure connections.
2. Ensure that the inverter's power switch is turned off and that no flammable fumes are present.
3. Identify the Positive (+) and Negative (-) terminals of the 12 V battery or other DC source.
4. Install a fuse holder or breaker close to the Positive (+) terminal of the battery (or other DC source) (preferably within 7" of the terminal) .
5. Cut an appropriate short piece of the selected Positive wire and use this to piece to connect the Positive terminal of the battery (or other DC source) to one terminal of the fuse holder or breaker. Connect one end of the remaining length of wire to the other terminal of the fuse holder or breaker. Connect the other end of the wire to the Positive terminal of the inverter.
6. Connect the selected length of Negative wire between the Negative terminal of the battery (or other DC source) and the Negative (-) terminal of the inverter.
7. Insert a suitable fuse in the fuse holder.
8. Check to be sure that all connections are secure and tight.
9. Test the inverter by turning it on and plugging in a 100 Watt lamp or equipment.
10. If the inverter is not properly operating, then refer to the Troubleshooting Guide at page 14 of this manual.

CAUTION: Loose connectors may cause overheated wires and melted insulation.

SWITCHING ON AND SWITCHING OFF ON LOAD
Please ensure that the following procedure is used for switching on and switching off the inverter when a load is already connected to the inverter:

Switching on

1. Switch off the load connected to the inverter
2. Switch on the inverter
3. Wait for a few seconds
4. Switch on the load

Switching off

1. Switch off the load connected to the inverter
2. Switch off the inverter

CONNECTING LOADS

1. Make sure that the single load or the combined load requirement of your equipment does not exceed the inverter's output rating.
2. Switch off the inverter
3. Switch off the load
4. Plug the cord(s) from the load(s) into the AC receptacle(s) of the inverter
5. Switch on the inverter. Wait for a few seconds
6. The green LED indicator will be lighted to indicate that the inverter is functioning
7. Switch on the load(s)

The inverter is engineered to be connected directly to standard electrical and electronic equipment in the manner described above. **Do not connect the power inverter to household or RV AC distribution wiring. Do not connect the power inverter to any AC load circuit in which the Neutral conductor is connected to Ground (Earth) or to the Negative of the DC (battery) source.**

WARNING: Do not connect directly to AC distribution wiring. This inverter is NOT grid interactive.

OPERATING ENVIRONMENT

For best operating results, the inverter should be placed on flat surface, such as the ground, car floor, or other solid surface. The power cord allows easy positioning of the inverter. The inverter should only be used in locations that meet the following criteria:

DRY

Do not allow water and/or other liquids to come into contact with the power inverter. In all marine applications, do not install the inverter below or near the waterline and keep the inverter away from moisture or water.

COOL

Ambient air temperature should be between 30 degrees F (-1 degree C) non-condensing, and 105 degrees F (40 degrees C). Do not place the inverter on or near a heating vent or any piece of equipment which is generating heat above room temperature. Keep the inverter away from direct sunlight, if at all possible.

VENTILATED

The unit is cooled by load controlled fan (s). The fan(s) will be normally switched off at low loads to conserve battery power and will be switched on automatically once the load reaches a certain threshold. Keep the area surrounding the inverter clear to ensure free air circulation around the unit. Do not place items on or over the inverter during operation. An additional external fan is helpful if the inverter is operating at maximum power outputs for extended periods of time. The unit will shut down if the internal temperature exceeds the operating temperatures. The unit will restart after it cools.

SAFE

Do not use the inverter near flammable materials or in any locations that may accumulate flammable fumes of gases.

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OPERATING TIPS

RATED VERSUS ACTUAL CURRENT DRAW OF EQUIPMENT

Most electrical tools, appliances and audio/video equipment have labels that indicate the power consumption in Amps or Watts. Be sure that the power consumption of the item you wish to operate is less than inverter's power. (If the power consumption is rated in Amps AC, simply multiply by the AC Volts (115) to determine the approximate Wattage). The inverter will shut down if it is overloaded. The overload must be removed before the inverter will restart. Resistive loads are the easiest for the inverter to run. However, larger resistive loads, such as electric stoves or heaters, usually require more wattage than the inverter can deliver. Inductive loads, such as TV's and stereos, require more current to operate than do resistive loads of the same wattage rating. Induction motors, as well as some televisions, may require 2 to 6 times their wattage rating to start up. The most demanding in this category are those that start under load, such as compressors and pumps. To restart the unit after a shutdown due to overloading, remove the overload if necessary turn the power switch OFF, **wait for at least 3 minutes** and then switch ON again.

SIZING CHART FOR TYPICAL LOADS THAT REQUIRE HIGH STARTING SURGE

The manufacturers' specifications of the appliances and devices indicate only the running power required.

The surge power required by some specific types of devices has to be checked with the manufacturer, actually tested or guessed at best.

The Table below lists some common loads that require high surge power on start up. A "Sizing Factor" has been recommended against each which is a Multiplication Factor to be applied to the rated running Watt rating of the load to arrive at the continuous power rating of the inverter (Multiply the running Watts of the device / appliance by the Sizing Factor).

TYPE OF DEVICE OR APPLIANCE	SIZING FACTOR
Air conditioner	5
Refrigerator / Freezer (Compressor based)	5
Air Compressor	4
Sump Pump / Well Pump / Submersible Pump	3
Dishwasher	3
Clothes Washer	3
Microwave (In cases where the rated output power is the cooking power)	2
Furnace Fan	3
Industrial Motor	3
Portable Kerosene / Diesel Fuel Heater	3
Circular Saw	3
Bench Grinder	3
Incandescent / Halogen / Quartz Lamps	3
Laser Printer / Other Devices using Quartz Lamps for heating	3
Switched Mode Power Supplies	3
Photographic Strobe / Flash Lights (with respect to its Watt Sec rating)	4 *

*** In the case of photographic strobe / flash unit, the RMS surge power of the inverter should be more than 4 times the Watt Sec rating of the unit.**

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OPERATING TIPS

DETERMINING BATTERY SIZE

The power inverter will require DEEP CYCLE lead acid batteries of appropriate capacity.
The automotive SLI (Starting/lighting/Ignition) battery is not designed for repeated deep discharge. The SLI battery may not supply enough energy and its service life may be reduced.

To determine the minimum battery size that you will need to operate appliances, follow these steps:

1. Determine the AC wattage of each appliance and / or tool you will need to simultaneously operate from the inverter. To do this, read the labels on the equipment to be operated. Usually, power consumption is shown in Watts. If it is shown in Amps, multiply by 115 to determine the AC wattage.
2. For each appliance, estimate the number of hours the appliance will be in use between battery recharges.
3. For each appliance, determine the Watt-Hours of energy required by multiplying the AC wattage by the number of hours of use.
4. Add the Watt-Hours of energy for each appliance to get the total Watt-Hours of energy for all appliances to be used.
5. Divide the total Watt-Hours of energy on the AC side by 10 to get the total Ampere-Hour of energy on the 12 VDC side to support the operation of the appliances.
6. The Ampere-Hour (AH) capacity of the battery should be 2 times the total Ampere-Hour energy required on the 12 VDC side to support the operation of the devices (as calculated at step 5 above). Two times factor is necessary because batteries are normally not discharged below 50% capacity.

To get an estimate of the current (in Amps) that the battery is delivering, divide the load's AC consumption power (in Watts) by (10).

Keep in mind that most appliances are not operating for long periods of time. For example, a typical home-use coffee maker draws 500 Watts during its brew time of 5 minutes, but it maintains the temperature of the pot at about 100 Watts. Typical use of a microwave is only for a few minutes, sometimes at low power. Some exceptions to brief operating times are TVs, computers etc.

In most instances, the inverter can be left connected to the battery when not in use, make sure power switch is in the **OFF** position.

Battery performance drops in low temperature environment. Higher capacity batteries should be installed if the environmental temperature is below 20°C.

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PROTECTIVE FEATURES OF THE INVERTER

OVER TEMPERATURE PROTECTION
The unit is cooled by 2-speed fan(s). The fan(s) will run at slower speed up to certain threshold of power output and at full speed thereafter. In case the fan fails or if the cooling is inadequate due to higher ambient temperature or restricted air flow, the temperature inside the inverter will be too high and the unit will automatically shut down. Allow the unit to cool for at least 15 minutes before restarting after a heat-related shutdown. Unplug unit while cooling.

LOW BATTERY VOLTAGE PROTECTION
This condition is not harmful to the inverter but could damage the power source. The inverter automatically shuts down when input voltage drops to 10.5 Volts.

OVER VOLTAGE PROTECTION
The inverter will automatically shut down when the input voltage exceeds 15.3 Volts DC. Input voltage exceeding 16 Volts could damage the inverter.

OVERLOAD PROTECTION
The inverter will automatically shut down when the continuous draw exceeds rated Watts.

SHORT CIRCUIT PROTECTION
The inverter will shut down. Remove the short circuit and restart inverter.

EARTH FAULT PROTECTION
This inverter complies with the standard current leakage allowance. When large current leakage to earth terminal occurs, the protection circuit activates and shuts down the inverter, which prevents electric shock to humans. Turn OFF the inverter, unplug the fault AC appliance and then turn ON is the only way to restart it. The 1000, 1500 and 2000 W models are provided with a GFCI that will trip in case of any leakage on the load side. The GFCI will be required to be reset

LOW INPUT VOLTAGE ALARM
An alarm will sound when the voltage at the input terminals of the inverter drops to 11.0 Volts. This is an indication that either the battery terminal voltage has dropped due to its discharged condition and needs to be re-charged OR there is an excessive voltage drop across the wires connecting the inverter to the battery (due to use of thinner and longer length of wires that will produce higher voltage drop at higher loads OR due to loose connections). The user should stop operation of the electronic device at this time since the inverter will shut down automatically shortly thereafter, when the input voltage at the inverter further drops to 10.5 Volts. In case the alarm is due to the discharged condition of the battery, start your engine to recharge the battery / use an appropriate battery charger.

If the low voltage alarm sounds when the battery is fully charged, follow the steps for solving lack of output power in the Troubleshooting Guide at page 14.

NOTE: It is normal for the alarm to sound while the unit is being connected to or disconnected from the power source. This is not indicative of a problem.

	USB PORT (1)	REMOTE CONTROL PORT (2)	OUTPUT GFCI OUTLET	DC TERMINAL COVER (3)	LOAD CONTROLLED FAN
350W	YES	NO	NO	NO	YES
600W	YES	NO	NO	NO	YES
1000W	NO	YES	YES	YES	YES
1500W	NO	YES	YES	YES	YES
2000W	NO	YES	YES	YES	YES

(1) Standard USB charging port +5 VDC, 500mA

(2) Compatible with specific SAMLEX SSW-series remote control only. Connection with incompatible remote / wire will damage the power inverter / remote.

(3) DC Terminal Plastic Covers and Nuts are for terminal protection only, not for wire connection.

REMOTE CONTROL

Remote Control Model No. SSW-R1-12B has been provided. Please refer to separate manual for the above remote.

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TROUBLESHOOTING GUIDE

TROUBLE / SYMPTOMS	POSSIBLE CAUSE(S)	SUGGESTED REMEDIES
NO AC OUTPUT ***On the inverter*** • Green LED on front panel is ON • Yellow LED on front panel of the inverter for "Input Fault" is ON • Red LED is OFF • There is no buzzer alarm ***On Remote Control SSW-R1-12B (For SSW-1000-1500-2000-12A)*** • DC input voltage is being displayed • Power Bar Graph is OFF • Message "Input Fault" is flashing	**Over Temperature Shutdown** In case the fan fails or if the cooling is inadequate due to higher ambient temperature or restricted airflow, the temperature inside the inverter will start rising. Temperature rise is sensed at one of the DC side Mosfets. If this temperature exceeds 90C to 100C, the AC output will be switched OFF.	1. The inverter will remain latched in this shut down condition and will be required to be reset manually by switching OFF, waiting for 15 minutes and switching ON again. 2. Before using the inverter again, please ensure that the cause of over temperature has been removed
NO AC OUTPUT ***On the inverter*** • Green LED, Yellow LED & Red LED on front panel are OFF • There is no buzzer alarm ***On Remote Control SSW-R1-12B (For SSW-1000-1500-2000-12A)*** Remote Control display is OFF and cannot be switched ON	**No activity due to loss of DC input power to the inverter** 1. If there is no voltage at the DC input terminals: • Battery is dead • External DC input fuse is blown • Loose connection along the circuit from the battery to the DC input terminals 2. If there is voltage at the DC input terminals: • Internal DC input fuses have blown	1. Check DC side wire connections and fuses OR contact Technical Support
NO AC OUTPUT ***On the inverter*** • Green LED is ON • Red LED on the front panel is ON • Yellow LED on the front panel is OFF • There is no buzzer alarm ***On Remote Control SSW-R1-12B (For SSW-1000-1500-2000-12A)*** • DC input voltage is being displayed • Power Bar Graph is OFF • Message "Output Fault" is flashing	**Shut down due to overload or short circuit or ground fault / leakage** 1. Inverter has shut down because the power drawn by the load is more than the continuous / surge ratings or there is a short circuit on the load side. 2. In Models SSW-350-12A and SSW-600-12A, this shut down could also be due to ground fault / leakage on the load side (These models have built in Ground Fault Protection Circuit).	1. Reduce the load or disconnect the load that is causing overloading. 2. Check for shorting and remove the short. In case of SSW-350 / SSW-600, also check for Ground fault on the load side 3. When the inverter shuts down due to overload, it will be latched in shutdown condition and will require a manual reset at the inverter by switching OFF and then switching ON. Switch off the inverter. Wait for 3 min for the internal latching circuit to de-energize and then switch ON again after removing the cause of overload / short circuit 4. **NOTE:** SSW-1000-12A, SSW-1500-12A and SSW-200-12A cannot be reset by using the ON / OFF push button on the Remote. Manual reset, as explained above, has to be carried out with the help of the ON / OFF switch on the inverter
NO AC OUTPUT ***(For SSW-1000-1500-2000-12A)*** ***On the Duplex NEMA5-20R GFCI outlet*** • The small Green LED light on the GFCI outlet is OFF • The "Reset Button" has popped out ***On the inverter*** • Green LED on the front panel of the inverter is ON • Yellow LED and Red LED on the front panel of the inverter are OFF • There is no buzzer alarm ***On the Remote Control SSW-R1-12B*** • Power Bar Graph is OFF • Backlight is dimmed • DC input voltage is being displayed	**GFCI has tripped due to ground fault / leakage on the load side** 1. Due to ground fault / leakage on the Load Side of the GFCI, the Load Side has been mechanically disconnected from its AC input side by the relay inside the GFCI. 2. Internally, the inverter will still be working normally and the rated AC output voltage will be available on the internal Line Side of the GFCI but not on the external Load Side of the GFCI due to tripped relay in the GFCI.	Use the "Reset" button on the GFCI outlet to reset the mechanical switch to the ON position after removing the cause of the ground fault / leakage.

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TROUBLESHOOTING GUIDE

TROUBLE / SYMPTOMS	POSSIBLE CAUSE(S)	SUGGESTED REMEDIES
AC OUTPUT IS AVAILABLE ***On the inverter*** • Green LED on the front panel of the inverter is ON • Red LED is OFF • Buzzer alarm sounds intermittently when DC input voltage drops to Low DC Input Voltage Alarm Threshold of 11V +/- 0.3V when delivering high power loads • Yellow LED comes ON when buzzer alarm is sounded. ***On the Remote Control SSW-R1-12B (For SSW-1000-1500-12A)*** • DC input voltage is being displayed and intermittently drops to Low DC Input Voltage Alarm Threshold of 11V +/- 0.3V when delivering high power loads • Message "Input Fault" intermittently flashes whenever DC input voltage drops to Low DC Input Voltage Alarm Threshold of 11V +/- 0.3V • Power Bar Graph will be ON if the output power is > 50W to 100W	**Intermittent buzzer alarm due to intermittent high AC loads** 1. DC input wire size is not adequate for higher capacity loads OR there is loose connection between the battery and the inverter leading to DC input voltage falling below the Low DC Input Voltage Alarm Threshold of 11V +/- 0.3V 2. The battery has developed sulfation due to undercharging. In this condition, the internal resistance of the battery rises above normal and hence causes abnormal voltage drop on its terminals at higher discharge current consumed by higher capacity load	1. Use thicker wires between the battery and the inverter and tighten all DC input circuit connections 2. Check internal resistance of the battery and remove sulfation by equalizing the battery or replace the battery
NO AC OUTPUT ***On the inverter*** • Green LED on the front panel of the inverter is ON • Red LED is OFF • Buzzer alarm sounds all the time • Yellow LED is ON ***On the Remote Control SSW-R1-12B (For SSW-1000-1500-2000-12A)*** • DC input voltage is being displayed and has dropped to Low DC Input Voltage Shutdown Threshold of 10.5V +/- 0.3V • Message "Input Fault" is flashing • Power Bar Graph is OFF • LCD is dimmed	**Shutdown due to low DC input voltage** 1. DC input wire size is not adequate for the capacity of the AC load OR there is loose connection between the battery and the inverter leading to DC input voltage falling below the Low DC Input Voltage Shutdown Threshold of 10.5V +/- 0.3V 2. The battery has developed sulfation due to undercharging. In this condition, the internal resistance of the battery rises above normal and hence causes abnormal voltage drop on its terminals at higher discharge current consumed by higher capacity load	1. Use thicker wires between the battery and the inverter and tighten all DC input circuit connections 2. Check internal resistance of the battery and remove sulfation by equalizing the battery or replace the battery
AC OUTPUT IS AVAILABLE ***On the inverter*** • Green LED on the front panel of the inverter is ON • Red LED is OFF • Buzzer alarm sounds when DC input voltage drops to Low DC Input Voltage Alarm Threshold of 11V +/- 0.3V even on low AC loads • Yellow LED comes ON when buzzer alarm is sounded. ***On the Remote Control SSW-R1-12B (For SSW-1000-1500-2000-12A)*** • DC input voltage is being displayed and drops to Low DC Input Voltage Alarm Threshold of 11V +/- 0.3V even at low loads • Message "Input Fault" flashes whenever DC input voltage drops to Low DC Input Voltage Alarm Threshold of 11V +/- 0.3V • Power Bar Graph is ON if the output power is > 50W to 100W	**Buzzer alarm due to low DC input voltage even at low AC loads** The battery is almost discharged	Recharge the battery.

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TROUBLESHOOTING GUIDE

TROUBLE / SYMPTOMS	POSSIBLE CAUSE(S)	SUGGESTED REMEDIES
NO AC OUTPUT ***On the inverter*** • Green LED on the front panel of the inverter is ON • Red LED is OFF • Buzzer alarm is OFF • Yellow LED is ON ***On the Remote Control SSW-R1-12B (For SSW-1000-1500-2000-12A)*** • DC input voltage is being displayed and has risen to High DC Input Voltage Shutdown Threshold of 15.3V +/- 0.3V • Message "Input Fault" is flashing • Power Bar Graph is OFF • LCD is dimmed	**Shutdown due to high DC input voltage** DC input voltage has risen to High DC Input Voltage Shutdown Threshold of 15.3V +/- 0.3V	1. Switch OFF the AC load and the inverter. 2. Disconnect the DC input to the inverter 3. Check the output voltages of the battery and charging source and ensure these are below the High DC Input Voltage Shutdown Threshold of 15.3V +/- 0.3V 4. Check that a 24V battery is not being used instead of 12V battery 5. The unit will reset automatically once the voltage drops to 14.9V +/- 0.2V 6. **CAUTION!** Voltage input of > 16 V will permanently damage the inverter
INVERTER DOES NOT SHUT DOWN WHEN REMOTE CONTROL SSW-R1-12B IS SWITCHED OFF (For SSW-1000-1500-2000-12A)	**The ON / OFF switch on the inverter is in ON condition**	When using the Remote Control SSW-R1-12B, ensure that the ON / OFF switch on the inverter is in OFF position
MOTORIZED POWER TOOL WILL NOT START	Excessive start-up current from the load is activating the Soft Start Circuit and is reducing the output voltage and consequently the current to a level where the starting torque required by the motor is not sufficient to turn the motor. (Starting torque in a motor is proportional to Voltage and the Current)	If appliance does not start, then the appliance is drawing excessive power and will not work with the inverter
MOTORIZED POWER TOOL DOES NOT OPERATE AT CORRECT SPEED	Purely inductive load with higher reactive power and lower Power Factor is activating the soft start circuitry and reducing the output voltage resulting in reduced speed	Make the load not purely inductive. Operate an incandescent lamp at the same time as the motor. This will reduce the reactive power and raise the Power Factor so that the Soft Start Circuit is not activated

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FUSE REPLACEMENT

FUSES INSIDE THE INVERTER

The AC side of this inverter is protected by an integral electronic overload circuit and will automatically reset in some cases.

More than that, this inverter is equipped with a DC side fuses that are located inside the inverter. Normally, these fuses will not blow unless a serious problem occurs.

Please DO NOT replace the fuses yourself. We recommend you contact technician to find and fix the problems. High voltage and high temperature inside!

CAUTION: NO USER-SERVICEABLE COMPONENTS INSIDE. DO NOT ATTEMPT TO OPEN THE INVERTER.

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SPECIFICATIONS

	MODEL NO.	SSW-350-12A	SSW-600-12A	SSW-1000-12A	SSW-1500-12A	SSW-2000-12A
INPUT	DC INPUT VOLTAGE RANGE	10.5 - 15.3 VDC (± 0.3 VDC)				
	DC INPUT CURRENT AT RATED LOAD	35A	60A	100A	150A	200A
	DC INPUT CURRENT AT NO LOAD	< 0.5A	< 0.7A	< 0.9A	< 1.0A	< 1.1A
OUTPUT	AC OUTPUT VOLTAGE	115 VAC (± 5 VAC)				
	AC OUTPUT FREQUENCY	60 Hz (± 1Hz)				
	AC OUTPUT WAVE FORM	PURE SINE WAVE				
	CONTINUOUS ACTIVE OUTPUT POWER	350W	600W	1000W	1500W	2000W
	MAXIMUM ACTIVE SURGE POWER (LESS THAN 1 SEC)	700W	1200W	2000W	3000W	400 W
	PEAK EFFICIENCY	89%	89%	89%	90%	90%
PORTS	USB CHARGING PORT (+5 VDC, 500 MA)	YES	YES	NO	NO	NO
	REMOTE CONTROL PORT (8 POSITION MODULAR CONNECTOR)	NO	NO	YES	YES	YES
PROTECTIONS	LOW INPUT VOLTAGE WARNING ALARM	11.0 VDC ± 0.3 VDC				
	LOW INPUT VOLTAGE SHUTDOWN	10.5 VDC ± 0.3 VDC				
	HIGH INPUT VOLTAGE SHUTDOWN	15.3 VDC ± 0.3 VDC				
	OVERLOAD/ SHORT CIRCUIT SHUTDOWN	YES				
	OVER TEMPERATURE SHUTDOWN	YES				
	COOLING	2-SPEED FAN				
CONNECTIONS	INPUT	TERMINALS WITH THUMB SCREW (M4)		NUT AND BOLT (M9)		
	OUTPUT	2 x NEMA5-15R NORTH AMERICAN RECEPTACLES		DUAL NEMA5-20R NORTH AMERICAN RECEPTACLES WITH GFCI		
SAFETY	COMPLIANCE	LISTED TO UL STANDARD UL-458				
GENERAL	OPERATING AMBIENT TEMPERATURE	0°C to 40°C; 32°F to 104°F				
	STORAGE TEMPERATURE	-30°C to 70°C; -26°F TO 158°F				
	DIMENSIONS, IN (L X W X H)	7.87 X 6.10 X 2.24	9.06 X 6.10 X 2.24	10.43 X 8.74 X 3.46	12.2 X 8.74 X 3.46	12.2 X 8.74 X 3.46
	DIMENSIONS, MM (L X W X H)	200 X 155 X 57	230 X 155 X 57	265 X 222 X 88	310 X 222 X 88	310 X 222 X 88
	WEIGHT, KG	0.7	0.9	2.6	3.2	3.8
	WEIGHT, LB	1.5	2	5.7	7.1	8.4
ACCESSORIES INCLUDED	DC INPUT WIRES WITH BATTERY CLAMPS	3' AWG #12	3' AWG #8	NO	NO	NO
	REMOTE CONTROL SSW-R1-12B	NO	NO	YES	YES	YES